New Technique To Measure Leptin Activity

Chicken meat is already lean, but Agricultural Research Service scientists have made a key genetic discovery that could help produce chickens with even less fat.

Chris Ashwell of the agency's Growth Biology Laboratory in Beltsville, Maryland, recently discovered the presence of a protein called leptin in chickens. Leptin has long been associated with obesity but until now had been found only in mammals such as pigs, cows, mice, and humans. As a result, Ashwell and colleagues Mark Richards and John McMurtry developed a technique to study the hormonal activity of leptin in chickens.

Maximizing meat and improving production efficiency are major goals for scientists studying chickens. That's because breeding broiler chickens for growth has resulted in increased fat deposition—and reduced reproductive efficiency—in the birds. "What this means is that obesity is becoming a problem in broiler chickens," Ashwell says.

Ashwell and his team hope to use their technique to find a way to regulate the leptin levels in chickens and reduce the birds' appetites. This would make it easier to manage broiler production and still provide consumers with quality meat, Ashwell explains.

"Commercial industries may eventually use the technique to select birds for feeding behavior that does not affect the growth of young birds," he says.

The technique, perfected by Richards and Ashwell, uses a method called capillary electrophoresis to distinguish and quantify genetic material unique to leptin. The process takes only 8 minutes. The team won an award from Beckman Coulter, Inc., for achievements in capillary electrophoresis with this technique.

Leptin, which regulates appetite and energy expenditure, can lead to extreme obesity, diabetes, and infertility in mammals if the gene for leptin production is defective. Leptin is found in fat tissue of mammals and chickens, but in chickens it's also found in the liver.

"Two areas of importance to producers and consumers are increased chick production and improved animal well-being," says Ashwell. Chicks with a smaller appetite may provide a solution to these concerns."—By **Sarah Tarshis,** formerly with ARS.

This research is part of Animal Production Systems, an ARS National Program (#102) described on the World Wide Web at http://www.nps.ars.usda.gov/programs/appvs.htm.

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Reducing Methane Emissions From Rice

Rice, one of the most versatile foods, is the foundation of many dishes, including rice pudding, rice cakes, beans and rice, and fried rice. So, it's no wonder that world rice production is 384 million tons. Rice is the primary food for about 50 percent of the world's population. It may also have a major impact on global warming by contributing to the emission of an important greenhouse gas: methane.

"Rice is a plant that grows best in wet soil, with its roots flooded," says L. Hartwell Allen. "But flooded rice crops emit substantial amounts of methane to the atmosphere, especially when fresh organic matter—like plant residues—is added back to the soil." Allen is a soil scientist in ARS' Crop Genetics and Environmental Research Unit in Gainesville, Florida.

Methane is a gas that contributes to the greenhouse effect, having a 20-fold greater global warming potential than carbon dioxide (CO_2). Some studies show that up to 20 percent of global methane emissions come from flooded rice fields.

For the past few years, Allen and colleague Jeff T. Baker, now with ARS' Remote Sensing and Modeling Laboratory in Beltsville, Maryland, have studied the effects of global change on flooded rice and found that rice could stand a little drying out.

In a recent study, they simulated potential global change conditions—increased drought and rising CO_2—by growing rice plants in special outdoor chambers. The studies showed that rice yields drop when the plants are grown during short, 2-week droughts occurring when plants flower. However, when the researchers doubled CO_2 levels by injecting the gas into the chambers, the plants maintained yield while using less water and enduring a longer drought period.

Allen and Baker also recently discovered that periodically draining the soil to aerate roots with atmospheric oxygen drastically decreases methane emissions. "This may be an easy on-farm practice that would help manage methane emissions," says Allen.

"Our research shows that reducing methane emissions from rice fields is important in helping to reduce or prevent the contribution of rice to global warming," notes Allen. "Since the United States produces only a small fraction of the world's rice, this water management practice needs to be tested and applied more internationally, especially in Asia."—By **Tara Weaver-Missick,** ARS.

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